

Notice of Allowability

Application No.

10/512,066

Examiner

Rip A. Lee

Applicant(s)

MATSUURA ET AL.

Art Unit

1713

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to October 6, 2006.
2. ☒ The allowed claim(s) is/are 1-4 and 7-10.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|--|---|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date _____ |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____ | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other _____ |

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Eugene Perez on December 20, 2006.

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| Claim 1, line 3 | replace "with use" with "in the presence" |
| Claim 1, line 8 | replace "and" with "or" |
| Claim 2, line 3 | replace "with use" with "in the presence" |
| Claim 3, line 3 | replace "with use" with "in the presence" |
| Claim 4, line 3 | replace "with use" with "in the presence" |
| Claim 7, line 2 | replace "claim 1" with "any one of claims 1 to 4" |
| Claim 8, line 2 | replace "claim 1" with "any one of claims 1 to 4" |
| Claim 9, line 3 | replace "claim 1" with "any one of claims 1 to 4" |
| Claim 9, line 6 | delete "when the copolymerization is carried out under conditions" |
| Claim 9, line 7 | delete entire line "such...gas" |
| Claim 9, line 8 | delete entire line "phase...partial" |
| Claim 9, line 9 | delete "pressure of 0.6 MPa or above" |
| Claim 10, line 3 | replace "claim 1" with "any one of claims 1 to 4" |

Allowable Subject Matter

The following is an examiner's statement of reasons for allowance: Claims 1-4 and 7-10 are allowed.

The present invention is drawn to a process for producing an ethylene/alpha-olefin/non-conjugated polyene copolymer comprising copolymerizing ethylene, and alpha-olefin and a non-conjugated polyene in a hydrocarbon solvent in the presence of a polymerization catalyst system comprising (A) a transition metal represented by formula (I), (B) at least one compound selected from (B-1) to (B-3), and removing unreacted monomers and hydrocarbon solvent from the copolymer solution without removing catalyst residue, wherein the copolymerization is carried out at a polymerization temperature of 100 °C or above and a polymerization pressure of 2.7 MPa or above such that the non-conjugated polyene concentration in the polymerization solution is less than the maximum non-conjugated polyene concentration C_{\max} (mol/L) indicated below:

$C_{\max} = 0.050$ (mol/L) when copolymer has iodine value (IV) of 9.0 to less than 17.0 g/100g or $C_{\max} = 0.104$ (mol/L) when copolymer has iodine value (IV) of 17.0 g/100g or above.

See claims for full structural details of components (A) and (B).

Mehta *et al.* (U.S. 6,300,451) discloses a process of making an ethylene/ α -olefin/non-conjugated diene (ethylene/butene/1,5-hexadiene) copolymer in the presence of a hydrocarbon solvent and a transition metal based catalyst at a reaction temperature 140 °C and reactor pressure of about 1300 bar (130 MPa). The reference does not teach use of the catalyst of the instant claims.

Kolthammer *et al.* (WO 98/02471) discloses a process of making an ethylene/ α -olefin/non-conjugated diene (ethylene/propylene/ENB) copolymer in the presence of a hydrocarbon solvent and a transition metal based catalyst. The reaction temperature is above 115 °C, and the reactor pressure is about 525 psig (3.62 MPa). The reference does not teach use of the catalyst of the instant claims.

Fujita *et al.* (U.S. 6,209,997; equivalent document of JP 11-315109, cited as "X" reference in international search report) teaches use of catalysts that are essentially the same as that recited in the instant claims for ethylene-butadiene copolymerizations at ambient conditions. There is no specific teaching of a process for producing an ethylene/alpha-olefin/non-conjugated polyene copolymer, and although such an embodiment might be contemplated, the patent does not disclose or fairly suggest polymerization conditions recited in the claims in order to obtain an ethylene/alpha-olefin/non-conjugated polyene copolymer under conditions where the claimed relationship between C_{max} and iodine value is followed.

JP 5-262827, also cited as "X" reference in international search report, teaches a process for making ethylene/alpha-olefin/non-conjugated polyene copolymer in the presence of standard metallocene catalysts. The patent does not teach use of the catalyst of the instant claims.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Art Unit: 1713

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rip A. Lee whose telephone number is (571)272-1104. The examiner can be reached on Monday through Friday from 9:00 AM - 5:00 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu, can be reached at (571)272-1114. The fax phone number for the organization where this application or proceeding is assigned is (571)273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <<http://pair-direct.uspto.gov>>. Should you have questions on the access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll free).

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December 20, 2006



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